THAT WHICH IS CLAIMED:

1. A method of growing silicon carbide, the method comprising:

introducing a seed of silicon carbide into a sublimation system;

introducing a silicon carbide electrode into the sublimation system;

introducing a second electrode into the sublimation system adjacent the silicon carbide electrode, wherein the silicon carbide electrode and the second electrode are separated by a gap;

establishing an electric arc across the gap between the silicon carbide electrode and the second electrode to vaporize at least part of the silicon carbide electrode and cause at least some of the vaporized silicon carbide materials to form silicon carbide on the silicon carbide seed.

2. The method of Claim 1, wherein the second electrode is a silicon carbide electrode.

3. The method of Claim 2, further comprising controlling the power dissipated across the gap to control the flow of vaporized Si, Si_2C and SiC_2 from the silicon carbide electrode and the second electrode to the seed crystal.

4. The method of Claim 2, wherein controlling the power dissipated across the gap comprises moving at least one of the silicon carbide electrode and the second electrode as they vaporize during the sublimation process to maintain a constant gap between the silicon carbide electrode and the second electrode.

5. The method of Claim 2, further comprising maintaining the pressure within the sublimation system at a substantially constant level during the sublimation process.

6. The method of Claim 1, further comprising controlling the power dissipated across the gap to control the flow of vaporized Si, Si_2C and SiC_2 from the silicon carbide electrode to the seed crystal.

7. The method of Claim 6, wherein the power dissipated across the gap is controlled to maintain a substantially constant flow of vaporized Si, Si_2C

and SiC_2 per unit area per unit time from the silicon carbide electrode to the seed crystal.

8. The method of Claim 6, wherein controlling the power dissipated across the gap comprises moving at least one of the silicon carbide electrode and the second electrode during the sublimation process to maintain a constant gap between the silicon carbide electrode and the second electrode.

9. The method of Claim 1, further comprising moving at least one of the silicon carbide electrode and the second electrode to maintain a substantially constant separation between the silicon carbide electrode and the second electrode.

10. The method of Claim 1, further comprising maintaining the pressure within the sublimation system at a substantially constant level during the sublimation process.

11. The method of Claim 10, where the substantially constant pressure level is pre-selected for growth of a pre-selected polytype of silicon carbide.

12. The method of Claim 10, further comprising:

raising the temperature of the seed to a temperature lower than the temperature at which silicon carbide sublimes; and

raising the temperature of the silicon carbide electrode to a temperature lower than the temperature at which silicon carbide sublimes.

13. The method of Claim 12, further comprising raising the temperature of the inner walls of the furnace to a temperature higher than the temperature of the seed.

14. The method of Claim 1, wherein the internal temperature of the furnace, the position of the silicon carbide electrode and the second electrode, the voltage drop across the gap and the current conducted across the gap are configured so as to maintain the end of the silicon carbide electrode adjacent the gap at a substantially constant temperature during the sublimation process.

15. The method of Claim 14, where the substantially constant temperature is pre-selected for growth of a pre-selected polytype of silicon carbide.

16. The method of Claim 6, wherein controlling the power dissipated across the gap to control the flow of vaporized Si, Si_2C and SiC_2 from the silicon carbide electrode to the seed crystal comprises:

sensing a voltage drop across the gap; and

adjusting the relative location of the silicon carbide electrode and the second electrode so as to maintain the voltage drop at a constant level.

17. The method of Claim 16, further comprising rotating the seed during at least part of the sublimation process.

18. The method of Claim 6, wherein establishing a high temperature arc between the silicon carbide electrode and the second electrode comprises activating an alternating current power supply that is connected to one of the silicon carbide electrode and the second electrode.

19. The method of Claim 18, wherein the frequency at which the alternating current power supply is operated is selected to maintain substantially the same rate of vaporization of the silicon carbide electrode.

20. The method of Claim 2, wherein the silicon carbide electrode is formed by sintering silicon carbide powder.

21. The method of Claim 20, wherein the silicon carbide electrode is formed from an n-type carrier rich silicon carbide source powder.

22. The method of Claim 20, wherein the silicon carbide electrode is formed from a p-type carrier rich silicon carbide source powder.

23. The method of Claim 2, wherein the internal temperature of the furnace, the pressure within the furnace and the voltage and current associated with the arc are maintained so as heat a constant volume of the silicon carbide electrode above the temperature where sublimation occurs during the crystal growth phase of the sublimation process.

24. A method of growing silicon carbide, the method comprising:

electrically arcing a silicon carbide source to sublimate silicon and carbon containing material from the silicon carbide source and cause at least some of the

silicon and carbon containing material to form silicon carbide on a silicon carbide seed.

25. The method of Claim 24, wherein electrically arcing a silicon carbide source comprises establishing an electrical arc between a pair of spaced apart silicon carbide electrodes.

26. The method of Claim 24, further comprising controlling the power dissipated across a gap between the pair of spaced apart silicon carbide electrodes to control the flow of vaporized Si, Si_2C and SiC_2 from the pair of silicon carbide electrodes to the silicon carbide seed.

27. The method of Claim 26, wherein the power dissipated across the gap is controlled to maintain a substantially constant flow of vaporized Si, Si_2C and SiC_2 per unit area per unit time from the pair of silicon carbide electrodes to the silicon carbide seed.

28. The method of Claim 26, wherein controlling the power dissipated across the gap comprises moving at least one of the pair of silicon carbide electrodes as they vaporize during the sublimation process to maintain a constant gap between the pair of silicon carbide electrodes.

29. The method of Claim 24, further comprising maintaining the pressure within the sublimation system at a substantially constant level during the sublimation process.

30. The method of Claim 25, wherein the sublimation process occurs within a heated furnace, and wherein internal temperature of the furnace, the position of the pair of silicon carbide electrodes, the voltage drop across the spacing between the pair of silicon carbide electrodes and the arc current are configured so as to maintain the ends of the pair of silicon carbide electrodes adjacent the arc at a substantially constant temperature during the sublimation process.

31. The method of Claim 26, wherein controlling the power dissipated across the gap to control the flow of vaporized Si, Si_2C and SiC_2 from the pair of silicon carbide electrodes to the silicon carbide seed comprises:

sensing a voltage drop across the gap; and

adjusting the relative location of the silicon carbide electrodes so as to maintain the voltage drop at a constant level.

32. The method of Claim 24, wherein the sublimation process occurs within a heated furnace, and wherein the internal temperature of the furnace, the pressure within the furnace and the voltage and current associated with the arc are maintained so as heat a constant volume of the silicon carbide source above the temperature where sublimation occurs during the crystal growth phase of the sublimation process.

33. A method of growing silicon carbide, the method comprising:

heating a furnace to a temperature below the temperature at which silicon carbide sublimes;

creating a local high temperature zone within a furnace that is above the temperature at which silicon carbide sublimes;

introducing a silicon carbide source material into the high temperature zone to sublimate silicon and carbon containing material from the silicon carbide source and cause at least some of the silicon and carbon containing material to form silicon carbide on a silicon carbide seed.

34. The method of Claim 33, wherein the local high temperature zone is created via an electric arc.

35. The method of Claim 33, wherein the silicon carbide source material is introduced into the high temperature zone by moving the silicon carbide source material.

36. The method of Claim 33, wherein the silicon carbide source material is introduced into the high temperature zone by moving the heating source used to create the local high temperature zone.

37. A silicon carbide sublimation system comprising:

a furnace;

a silicon carbide seed holder within the furnace;

a silicon carbide source holder within the furnace; and

a silicon carbide source arcing system that is configured to electrically arc a silicon carbide source that is held by the silicon carbide source holder to sublimate silicon and carbon containing material from the silicon carbide source and cause at least some of the silicon and carbon containing material to form silicon carbide on a silicon carbide seed that is held by the silicon carbide seed holder.

38. The system of Claim 37, wherein the silicon carbide source comprises at least one silicon carbide electrode.

39. The system of Claim 37, wherein the silicon carbide source comprises first and second silicon carbide electrodes, and wherein the silicon carbide source holder hold the first silicon carbide electrode adjacent the second silicon carbide electrode and separated from the second silicon carbide electrode by a gap and, wherein the system further comprises a power supply coupled to at least one of the first and second silicon carbide electrodes.

40. The system of Claim 39, further comprising a voltage detector configured to measure the voltage drop across the gap between the first and second silicon carbide electrodes.

41. The system of Claim 40, further comprising a positioning unit coupled to the silicon carbide source holder that is responsive to the output of the voltage detector.

42. A silicon carbide sublimation system comprising:

a furnace;

a silicon carbide seed within the furnace;

a silicon carbide source within the furnace; and

a silicon carbide source arcing system that is configured to electrically arc the silicon carbide source to sublimate silicon and carbon containing material from the silicon carbide source and cause at least some of the silicon and carbon containing material to form silicon carbide on the silicon carbide seed.

43. The system of Claim 42, wherein the silicon carbide source comprises at least one silicon carbide electrode.

44. The system of Claim 42, further comprising a voltage detector configured to measure the voltage drop across the gap between the silicon carbide electrode and a second electrode.

45. The system of Claim 44, further comprising a positioning unit coupled to the silicon carbide source that is responsive to the output of the voltage detector.

46. The method of Claim 1, wherein the silicon carbide seed is a monocrystalline seed of silicon carbide, and wherein the silicon carbide formed on the monocrystalline silicon carbide seed is monocrystalline silicon carbide.

47. The method of Claim 24, wherein the silicon carbide formed on the silicon carbide seed is monocrystalline silicon carbide.

48. The method of Claim 2, wherein the silicon carbide electrode is formed from silicon carbide powder grown by a chemical vapor deposition technique.